REMARKS

Claims 1-14 are currently active.

The Examiner has objected to the figures. Replacement figures are submitted herewith which respond to and correct the objections by the Examiner. It should be noted that applicants cannot find where numeral 12 refers to an inorganic scintillator.

The Examiner has objected to the abstract. The abstract has been amended to obviate this objection. The Examiner has objected to the specification. The specification has been amended to obviate this objection.

The Examiner has objected to the claims. The claims have been amended to obviate this objection.

The Examiner has rejected Claim 1 as being anticipated by McCroskey. Applicants respectfully traverse this rejection.

In figure 12 of the McCroskey patent, the positron point source 120 is placed in front of HEAD 1. HEAD 1 is shown to be one of the conventional detectors of the PET scanner in column 26, line 11, column 26, line 26, column 26, lines 50-52. In figure 12 and in all references to the source, and detector, the source is placed near the detector. Since the detectors of a PET scanner detect the 511 keV gamma rays which result from the annihilation of a positron and an electron (and not the positrons themselves), the cited patent detects the arrival of a gamma ray, not the time of positron decay.

The detectors of a PET scanner detect gamma rays by converting the energy of the gamma ray into visible light which is then converted to an electrical signal by a photo-multiplier. Since they detect very small light flashes, they must be protected from ambient light, and are enclosed is a housing which is both light-tight and is normally made of thin metal (such as mu-metal or stainless steel to shield the photo-multipliers from magnetic fields). This material is thick enough to absorb positrons which would travel less that 0.1 mm in them. So even though this application does not what they detect when doing the timing alignment, it could only be gamma rays. Thus, by detection positrons which are detectable before the gamma rays, the present application is different than the McCroskey patent in this respect.

Also, they cannot align all detectors to a common reference clock as suggested above. In column 26, row 25, they state "In the second step, the positron point source is then moved to the opposite head . . .". Thus, a second reference crystal is being used in the second step, and then they describe how the two reference sets are resolved.

Accordingly, Claim 1 is not anticipated by McCroskey and is patentable over McCroskey.

The Examiner has rejected Claims 2-7 as being unpatentable over McCroskey in view of Baker. Applicants respectfully traverse this rejection. Claims 2-7 are dependent to parent Claim 1 and are patentable for the reasons Claim 1 is patentable.

In regard to Claim 2, in the McCroskey patent, they propose, (column 26, line 11) using fluorine-18, a short lived (110 minutes half-life) positron emitting isotope which is readily available in PET centres. The reason Claim 2 has the limitation of a longer lived isotope, is that it is sealed between two pieces of plastic scintillator (which is use to detect the

positrons). In the McCroskey patent, they are not detecting positrons and it would be more convenient to use F-18, but a longer lived isotope would work just as well.

In the McCroskey patent, the timing signal is not used as a timing reference for all the scanner's detectors. On page 22, it is clearly stated, "All detectors are timed with respect to a common source, the central trigger-source. Since there is only one trigger source, errors introduced by calibrating some time delays with respect to one detector and others with respect to an other, and so on, and then trying to align the groups are eliminated." As explained above, the McCroskey patent requires the source be moved to at least one other position, so it cannot be used to align all the detectors to a common timing reference.

In regard to Claim 6, using the technique proposed in the McCroskey patent, one cannot align all detectors to a common reference clock. The gamma rays used in the McCroskey patent both travel away from the source at 180 degrees. So, with the source as shown in figure 12 it is impossible to draw a line from one detector on head 1 to another defector on head 1 which passes through the source. They are simply not collinear since the detector is flat, and the source must be in front of it.

In regard to Claim 7, the way in which the gamma rays travel away from the point of positron annihilation makes it impossible to align the detectors simultaneously. The distinguishing feature of the present application is that positrons are emitted from the parent nucleus isotopically, and that direction of emission of the positron is uncorrelated with the direction of the gamma rays which result from positron annihilation. This was pointed out on page 22, line 23 to the top of page 23, lines 1-3. "Since the source is centrally located, the time taken for gamma rays to travel to each of the PET detectors is almost the same, so this time can be measured more precisely than if the source is moving beyond the periphery of the scanner's field of view as current practice."

Accordingly, Claims 2-7 are patentable over the applied art of record.

The Examiner has rejected Claims 8-14 as being unpatentable over McCroskey in view of Luitwieler in view of Hamill. Applicants respectfully traverse this rejection. Claims 8-13 are dependent to parent Claim 1 and are patentable for the reasons Claim 1 is patentable. Furthermore, Claim 14 is patentable for the reasons Claim 1 is patentable.

Hamill et al. discuss a line source for the normalization of the coincidence response from the scanner's detector pairs. Any radioactive source must be supported by some means, and line sources such as the one described by Hamill et al. are commonly used in almost PET scanners for measuring the attenuation correction required to make quantitative PET studies. These line sources are normally covered in a metal casing to ensure that the positrons annihilate close to their point of emission. This casing does cause the positrons to stop, but does not detect them. In the present invention, the purpose of the plastic is to detect the positrons as they slow down before they can combine with an electron and annihilate.

In regard to Claim 14, the Luitwieler patent refers to the counting of gamma rays and the measuring of their energy in order to calibrate the energy spectrum over a wide range of energies. It does not measure the time of decay. The present invention as stated in Claim 14 has some of the features of the Luitwieler patent but they are used for a very different purpose. Both has detectors for radioactivity, theirs detects gamma rays, the present application detects positrons, theirs records the gamma ray's energy as it primary objective, the present application records the time of radioactive decay as its primary objective.

Accordingly, Claims 8-14 are patentable over the applied art of record.

In view of the foregoing amendments and remarks, it is respectfully requested that the outstanding rejections and objections to this application be reconsidered and withdrawn, and Claims 1-14, now in this application be allowed.

Respectfully submitted,

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